

KELLOGG (J. H.)

THE RELATION OF STATIC
DISTURBANCES OF THE
ABDOMINAL VISCERA TO
DISPLACEMENTS OF THE
PELVIC ORGANS.

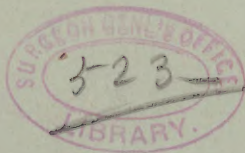
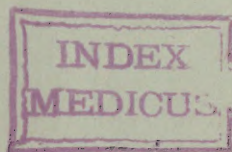
BY J. H. KELLOGG, M. D.,

Member of the British Gynecological Society, the International Periodical Congress of Gynecology and Obstetrics, American and British Associations for the Advancement of Science, the Société D'Hygiène of France, American Society of Microscopists, American Climatological Society, American Electro-Therapeutic Association, Tri-State Medical Society, American Medical Association, Michigan State Medical Society, Superintendent of the Battle Creek (Mich.) Sanitarium.

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THE RELATION OF STATIC DISTURBANCES OF THE ABDOMINAL VISCERA TO DIS- PLACEMENTS OF THE PELVIC ORGANS.*

BY J. H. KELLOGG, M. D.,
Battle Creek, Mich.

THE most characteristic feature of the new medical science to which the present century, and particularly the last half of it, has given birth, is the idea that health getting is not a matter of magic or of pill swallowing, but instead, in the majority of cases, at least, a matter of education and training. The chronic invalid is ill because he or she has violated the laws of health. Rational medicine regards disease as the result of the operation of nature's laws, and not a consequence of chance or of supernatural agencies. It would seem self-evident that the tissue changes, the functional disturbances, the pathological processes, which result from the long-continued violation of nature's laws, are not to be remedied by the most ingeniously managed medicinal antidoting any more than by the blind hopefulness of the faith healer or the mummeries of the mind curist. Nevertheless, it is a sad fact that too many members of the medical profession have failed to recognize that in its onward march of progress, true medical science has left behind the specifics and panaceas of the old régime, along with the astrology and alchemy of an earlier age, and are still engaged in combating disease on the basis of an effete and false philosophy, or else blindly following an unphilosophical and ever changing empiricism. This state-

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ment is true of every branch of medicine, but perhaps applies with less force to the department of gynecology than to any other, for the reason that this branch of medical science is almost wholly a creation of the last half century, and hence carries a smaller number of the ancient barnacles which adhere so tenaciously to almost every branch of practical medicine.

Rational medicine, as expounded first by Bigelow, then Holmes, and later by a whole generation of laboratory-trained physicians, recognizes as necessary, in chronic cases, the control of the entire life of the invalid. Grave chronic disease involves not a single organ, but many, usually, in fact, the entire body; and its cure necessitates, first of all, that the habits of the patient shall be strictly conformed to such principles and rules as will efficiently and curatively modify his disordered vital processes. Health is as much a matter of growth and development as is the sprouting of an acorn, the growing of an oak, or the raising of a crop of wheat. The rational physician keeps ever in mind the fact that the real curative force resides not in his medicine case, but in the constitution of the patient. Nature is the real curative agent. The physician really assists his patient toward recovery only when he studies the purpose of nature in her efforts, and supplies conditions which will aid nature in her work.

In no department of medicine do these principles find a better opportunity for eminently apt and proper illustration than in gynecology. But the purpose of this paper is not to dwell upon general principles, but to elucidate the governing ideas and to illustrate the practical application of a single point in etiology and therapeutics. The facts presented in this paper support the following propositions:—

1. *Displacement of the pelvic viscera is not, as a rule, an isolated pathological condition, but is associated with similar static disturbances of the viscera of the abdominal cavity.*

2. *The principal causes of uterine and ovarian displacements are such as affect the static relations of the viscera of the abdomen as well as those of the pelvis; and hence the rational treatment of pelvic displacements requires the removal of all causes of displacement of the abdominal as well as of the pelvic viscera, and the restoration of the normal supports of these organs.*

TABLE OF STRENGTH MEASUREMENTS.

Arranged from the Measurements of 100 Adult WOMEN, taken and compiled under the direction of J. H. KELLOGG, M. D., Battle Creek, Mich.

EXCEPT WHEN OTHERWISE INDICATED, QUANTITIES ARE EXPRESSED IN POUNDS AVOIRDUPOIS.

PER CENT	HEIGHT (inches).	WEIGHT.	ARMS.														LEGS.												TRUNK.				RESPIRATION.						TOTAL STRENGTH.					PER CENT.													
			R. Hand Flexors.	L. Hand Flexors.	R. Hand Extensors.	L. Hand Extensors.	R. Forearm Pronators.	L. Forearm Pronators.	R. Forearm Supinators.	L. Forearm Supinators.	R. Arm Flexors.	L. Arm Flexors.	R. Arm Extensors.	L. Arm Extensors.	R. Deltoid.	L. Deltoid.	R. Pectorals.	L. Pectorals.	R. Shoulder Retractors.	L. Shoulder Retractors.	R. Foot Flexors.	L. Foot Flexors.	R. Foot Extensors.	L. Foot Extensors.	R. Leg Flexors.	L. Leg Flexors.	R. Leg Extensors.	L. Leg Extensors.	R. Thigh Flexors.	L. Thigh Flexors.	R. Thigh Extensors.	L. Thigh Extensors.	R. Thigh Abductors.	L. Thigh Abductors.	R. Thigh Adductors.	L. Thigh Adductors.	Trunk Anterior.	Trunk Posterior.	Trunk R. Lateral.	Trunk L. Lateral.	Neck Anterior.	Neck Posterior.	Neck R. Lateral.		Neck L. Lateral.	Inspiration—Waist.	Inspiration—Chest.	Inspiration—Waist Expansion (in).	Inspiration—Chest Expansion (in).	Expiration—Pneumometer (N. M. S.).	Expiration—Spirometer (Cubic in.).	ARMS.	LEGS.	TRUNK.	CHEST.	ENTIRE BODY.	
1	68.5	175	112	110	25	25	60	55	72	65	60	50	60	55	60	58	90	90	95	90	80	82	300	300	88	80	145	140	168	165	170	168	120	115	111	105	115	490	140	135	28	65	65	65	165	220	6	0.5	5	60	255	1232	2337	1103	386	5058	1
2.5	68.0	168	110	107	23	24	52	53	58	57	47	41	52	51	52	55	89	85	92	82	76	76	284	278	84	80	125	118	159	154	156	154	98	104	110	99	110	446	132	127	26	63	53	60	152	193	5	3.5	3	57	237	1130	2155	1017	346	4648	2.5
5	67.1	159	102	92	22	21	48	49	51	51	40	38	48	49	46	49	82	79	77	74	70	71	263	256	78	79	108	104	131	127	136	134	88	95	106	90	103	386	121	122	25	60	48	49	129	158	4	9.5	1	51	224	1018	1936	914	288	4166	5
10	66.0	148	88	79	19	18	42	43	48	46	35	33	44	42	43	42	77	71	63	63	61	62	232	235	71	74	95	88	112	108	118	123	83	87	91	84	93	329	108	112	23	55	42	41	107	135	4	24	4	46	213	896	1724	803	243	3666	10
15	65.4	141	81	74	18	16	39	39	45	42	33	32	42	38	41	40	73	67	58	58	58	57	219	225	68	70	88	83	108	100	109	114	79	81	80	76	87	304	104	105	22	50	89	37	97	121	3	8.4	1	43	207	836	1615	748	219	3418	15
20	64.8	135	76	70	17	15	36	36	42	39	30	30	39	34	39	38	68	63	53	53	54	53	207	217	65	66	82	77	103	94	102	106	74	75	72	71	82	276	99	99	20	45	36	34	87	109	3	5.3	9	40	203	778	1518	691	197	3184	20
25	64.4	131	72	66	16	14	34	34	40	36	29	28	36	32	37	36	64	59	50	49	51	50	201	208	63	63	76	72	100	89	95	101	71	71	68	68	77	252	95	95	14	43	34	32	81	102	3	3.3	8	38	198	732	1447	647	184	3010	25
30	63.9	127	68	63	15	13	32	32	37	33	27	27	33	29	35	34	59	55	46	45	48	47	194	197	60	60	70	69	95	85	90	95	67	67	64	64	72	225	90	90	18	40	32	30	75	96	3	1.3	6	35	193	684	1372	597	172	2825	30
35	63.7	125	65	61	14	13	30	31	35	31	25	25	31	28	33	32	56	53	44	42	45	44	189	189	58	57	67	66	85	82	85	90	63	64	61	62	69	205	86	85	17	38	30	29	72	90	2	9.8	4	34	188	649	1307	559	163	2678	35
40	63.3	122	62	58	13	12	28	29	32	29	24	24	28	23	31	30	53	49	41	39	42	40	181	180	56	53	62	61	80	76	81	84	59	60	57	58	65	178	80	80	15	35	28	27	67	84	2	8.3	3	32	183	608	1230	508	152	2498	40
45	63.1	120	59	56	12	11	27	27	31	28	22	22	26	24	30	28	50	47	38	36	39	38	174	172	51	50	58	58	76	74	77	81	56	57	54	55	61	172	76	76	14	33	25	25	64	79	2	6.3	1	30	179	575	1170	484	144	2373	45
50	62.8	117	56	53	11	10	26	26	29	26	20	20	24	22	28	27	46	45	36	34	36	35	167	162	47	46	53	54	72	70	72	75	52	52	51	51	54	149	71	71	13	31	24	23	63	74	2	4.3	0	28	173	539	1099	436	134	2208	50
45	62.6	114	53	50	9	8	24	24	26	24	19	19	22	20	27	25	43	42	34	31	33	32	157	153	43	42	48	50	65	65	67	70	48	48	47	47	52	128	66	66	12	30	22	21	53	69	2	3.2	8	25	158	500	1015	397	125	2037	45
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35	62.1	109	47	44	7	7	22	21	23	22	16	15	18	16	24	22	38	37	30	26	29	28	140	136	35	33	43	41	57	56	59	60	40	41	40	39	44	103	56	55	10	26	19	18	48	60	2	0.2	5	22	159	435	875	330	108	1748	35
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25	61.7	104	41	38	6	5	20	18	21	18	12	11	14	13	22	19	32	32	26	23	23	21	118	116	26	24	32	32	47	46	50	49	32	32	34	32	36	85	48	46	8	22	15	15	39	50	1	2	21	148	371	714	275	89	1449	25	
20	61.4	102	38	34	5	5	19	17	19	17	11	10	12	12	20	18	30	29	24	22	20	19	108	106	22	22	30	29	42	42	45	45	29	29	31	28	32	71	44	41	7	20	13	13	35	46	1	6.2	1	16	143	342	647	247	81	1317	20
15	61.2	100	33	30	5	5	18	15	18	15	9	9	11	10	18	15	26	25	21	20	15	12	98	89	18	18	26	22	36	35	39	38	24	26	27	24	29	69	39	35	5	19	11	11	30	39	1	4.1	9	4	135	304	542	218	69	1133	15
10	60.7	98	29	27	4	4	16	15	16	14	8	8	10	10	15	14	22	21	19	18	12	10	79	70	14	14	22	17	33	32	33	34	21	24	22	22	26	61	33	30	5	17	10	9	25	33	1	3.1	8	11	127	270	459	191	58	978	10
5	59.7	96	25	23	3	3	14	12	15	10	5	5	6	7	9	9	18	17	13	14	9	7	58	51	10	9	14	10	25	26	26	26	19	19	17	18	21	47	26	24	5	12	7	7	18	26	1	0.1	5	8	114	208	344	149	44	745	5
2.5	58.6	89	23	20	2	2	10	10	12	9	5	5	6	5	5	5	12	12	10	9	5	5	37	34	7	5	6	6	17	17	18	18	12	12	11	13	20	32	22	20	4	10	5	5	12	24		9.1	5	5	78	161	223	118	36	538	2.5
1	58.0	79	20	20	2	2	10	10	8	5	5	4	5	5	5	5	10	10	8	5	5	5	20	15	5	5	5	5	10	10	10	10	10	10	10	10	20	30	20	20	2	10	5	5	10	20		8.1	5	5	60	139	145	112	30	426	1

Strength Measurements of Mc Taken 189 189 189 189 by

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CHART I.

TABLE OF STRENGTH MEASUREMENTS.

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PER CENT	HEIGHT (inches).	WEIGHT.	ARMS.															LEGS.													TRUNK.					RESPIRATION.					TOTAL STRENGTH					PER CENT											
			R. Hand Flexors.	L. Hand Flexors.	R. Hand Extensors.	L. Hand Extensors.	R. Forearm Pronators.	L. Forearm Pronators.	R. Forearm Supinators.	L. Forearm Supinators.	R. Arm Flexors.	L. Arm Flexors.	R. Arm Extensors.	L. Arm Extensors.	R. Deltoid.	L. Deltoid.	R. Pectorals.	L. Pectorals.	R. Shoulder Retractors.	L. Shoulder Retractors.	R. Foot Flexors.	L. Foot Flexors.	R. Foot Extensors.	L. Foot Extensors.	R. Leg Flexors.	L. Leg Flexors.	R. Leg Extensors.	L. Leg Extensors.	R. Thigh Flexors.	L. Thigh Flexors.	R. Thigh Extensors.	L. Thigh Extensors.	R. Thigh Abductors.	L. Thigh Abductors.	R. Thigh Adductors.	L. Thigh Adductors.	Trunk Anterior.	Trunk Posterior.	Trunk R. Lateral.	Trunk L. Lateral.	Neck Anterior.	Neck Posterior.	Neck R. Lateral.	Neck L. Lateral.	Inspiration—Waist.		Inspiration—Chest.	Inspiration—Waist Expans'n (in.).	Expiration—Chest Expans'n (in.).	Inspiration—Pneumometer (M. M. Mercury).	Expiration—Pneumometer (M. M. Mercury).	Inspiration—Spirometer (Cubic in.).	Expiration—Spirometer (Cubic in.).	ARMS.	LEGS.	TRUNK.	CHEST.
1	68.5	175	112	110	25	25	60	55	72	65	60	50	60	55	60	58	90	90	95	90	80	82	300	300	88	80	145	140	168	165	170	168	120	115	111	105	115	490	140	135	135	65	65	65	65	165	220	6.0	5.5	60	255	1232	2337	1103	386	5058	1
2.5	68.0	168	110	107	23	24	52	53	58	57	47	41	52	51	52	55	89	85	92	82	76	76	284	278	84	80	125	118	159	154	156	154	98	104	110	99	110	446	132	127	26	63	53	60	152	193	5.35	3.57	237	1130	2155	1017	346	4648	2.5		
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20	64.8	135	76	70	17	15	36	36	42	39	30	30	39	34	39	38	68	63	53	53	54	53	207	217	65	66	82	77	103	94	102	106	74	75	72	71	82	276	99	99	20	45	36	34	87	109	3.53	9.40	203	778	1518	691	197	3184	20		
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40	63.3	122	62	58	13	12	28	29	32	29	24	24	28	26	31	30	53	49	41	39	42	40	181	180	56	53	62	61	80	76	81	84	59	60	57	58	65	178	80	80	15	35	28	27	67	84	2.83	3.32	183	608	1230	608	152	2498	40		
45	63.1	120	59	56	12	11	27	27	31	28	22	22	26	24	30	29	50	47	38	36	39	38	174	172	51	50	58	58	76	74	77	81	56	57	54	55	61	172	76	76	14	33	27	25	64	79	2.63	1.30	179	575	1170	484	144	2373	45		
50	62.8	117	56	53	11	10	26	26	29	26	20	20	24	22	28	27	46	45	36	34	36	35	167	162	47	46	53	54	72	70	72	75	52	52	51	51	54	149	71	71	13	31	24	23	59	74	2.45	0.28	173	539	1099	436	134	2208	50		
45	62.6	114	53	50	9	8	24	24	26	24	19	19	22	20	27	25	43	42	34	31	33	32	157	153	43	42	48	50	65	65	67	70	48	48	47	47	52	128	66	66	12	30	22	21	55	69	2.32	8.25	168	500	1015	397	125	2037	45		
40	62.4	112	51	48	8	7	23	23	25	23	17	16	20	19	26	24	41	39	32	29	31	29	149	146	39	39	45	46	62	62	64	65	44	45	44	43	48	116	62	61	11	27	20	20	52	64	2.22	7.24	164	471	953	365	117	1906	40		
35	62.1	109	47	44	7	7	22	21	23	22	16	15	18	16	24	22	38	37	30	26	29	26	140	136	35	33	43	41	57	56	59	60	40	41	40	39	44	103	56	55	10	25	19	18	48	60	2.02	5.22	159	435	875	330	108	1748	35		
30	62.0	107	45	42	7	6	21	20	22	20	14	13	16	15	23	21	35	35	28	25	26	23	130	129	30	29	37	37	52	52	55	55	36	37	37	35	41	95	52	51	9	23	17	17	44	55	1.92	4.20	154	408	800	305	99	1612	30		
25	61.7	104	41	38	6	5	20	18	21	18	12	11	14	13	22	19	32	32	26	23	23	21	118	116	26	24	32	32	47	46	50	49	32	32	34	32	36	85	48	46	8	22	15	15	39	50	1.72	2.17	148	371	714	275	89	1449	25		
20	61.4	102	38	34	5	5	19	17	19	17	11	10	12	12	20	18	30	29	24	22	20	19	108	106	22	22	30	29	42	42	45	45	29	29	31	28	32	77	44	41	7	20	13	13	35	46	1.62	1.16	143	342	647	247	81	1317	20		
15	61.2	100	33	30	5	5	18	16	18	15	9	9	11	10	18	15	26	25	21	20	15	12	93	89	18	18	26	22	36	35	39	38	24	26	27	24	29	69	39	35	5	19	11	11	30	39	1.41	9.13	135	304	542	218	69	1133	15		
10	60.7	98	29	27	4	4	16	15	16	14	8	8	10	10	15	14	22	21	19	18	12	10	79	70	14	14	22	17	33	32	33	34	21	24	22	22	26	61	33	30	5	17	10	9	25	33	1.31	8.11	127	270	459	191	58	978	10		
5	59.7	96	25	23	3	3	14	12	15	10	5	5	6	7	9	9	18	17	13	14	9	7	58	51	10	9	14	10	25	26	26	26	19	19	17	18	21	47	26	24	5	12	7	7	18	26	1.01	5.8	114	208	344	149	44	745	5		
2.5	58.6	89	23	20	2	2	10	10	12	9	5	5	5	5	5	5	12	12	10	9	5	5	37	34	7	5	6	6	17	17	18	18	12	12	11	13	20	32	22	20	4	10	5	5	12	24	.91	5.5	78	161	223	118	86	538	2.5		
1	58.0	79	20	20	2	2	10	10	8	5	5	4	5	5	5	5	10	10	8	5	5	5	20	15	5	5	5	5	10	10	10	10	10	10	10	10	20	30	20	20	2	10	5	5	10	20	.81	5.5	60	139	145	112	30	426	1		

Strength Measurements of *Miss D* Taken *May 19, 1892* 189 189 189 by *J. H. P.*

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CHART II.

During the twenty years that I have been engaged in the study and practice of medicine, my attention has been constantly called to the utility of exercise in the treatment of diseases peculiar to women, and my medical work has fallen in such lines as have given me an opportunity to make a special study of this subject from a practical point of view.

A Graphic Study of the Proportionate Strength of the Trunk and the Extremities.

— Nearly ten years ago I constructed a dynamometer (Fig. 1), by means of which the energy exerted by any group of muscles in the body might be determined. The apparatus consists of a vertical rod, or rods, upon which moves a carriage bearing handles and levers, to which the various parts of the body to be tested are connected, and two cylinders, in one of which

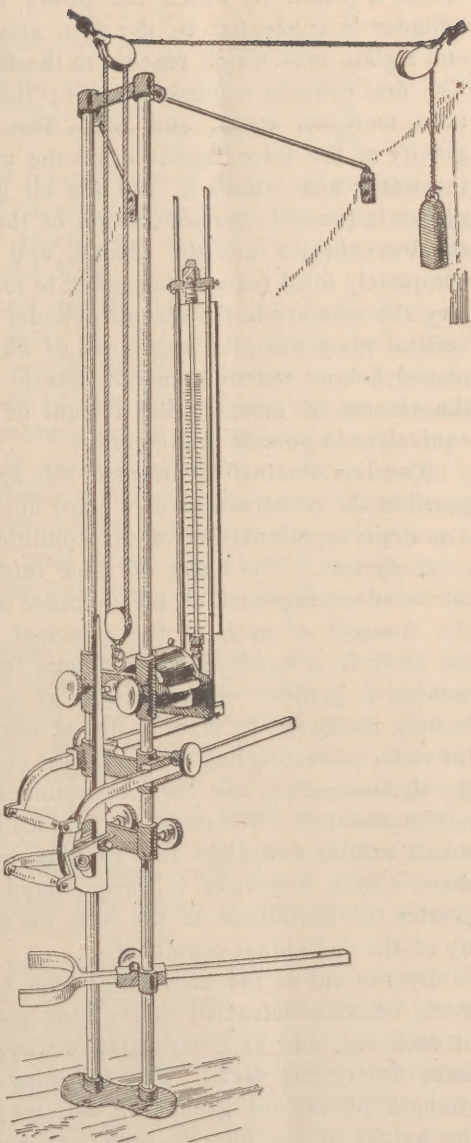


Fig. 1.—A Dynamometer adapted to testing the strength of the muscles of the human body.

moves a piston to which the power is applied. A second cylinder is connected to the first, and receives at its upper end a glass tube which reaches to the bottom of the cylinder. The first cylinder is filled with oil; the second cylinder contains mercury, water, and oil. The difference in specific gravity of the three liquids keeps the mercury at the bottom, the water next above it, and the oil uppermost. When the piston is pressed upon, a portion of the oil is displaced from the first cylinder into the second, and as both cylinders are completely filled (care being taken to remove every particle of air), the mercury in the second cylinder is forced up into the vertical glass tube, the upper end of which is closed. A scale placed behind the tube enables one to read by the height of the column of mercury, the amount of power applied, or its equivalent in pounds or kilograms.

The data obtained by means of this apparatus have rendered possible the construction of a chart upon which may be made a graphic representation of the condition of a person's muscular system. The chart or table referred to consists of a tabulated arrangement of the averages obtained by measuring the strength of each of the principal groups of muscles of the body in a hundred adult women in ordinary health. In making a graphic representation of a person's strength, it is only necessary to place a dot at each of the numbers on the chart corresponding to the results obtained by testing with the dynamometer, and then to connect these points with a continuous line. The chart of an ideally symmetrical person would exhibit a straight line running horizontally across the sheet. Such a person is never found in practice, and the greater the deviations of the line, the greater is the asymmetry of the individual examined.

By the aid of the assistants whom I have trained for the work, I have constructed charts from several hundred persons of each sex, and in a comparative study of them have noted many interesting facts. The following table represents the strength of various groups of muscles when compared with the weight of the body in both men and women, the weight of the body being considered as unity:—

	Man.	Woman.
The grasp of the hand.....	.7	.5
Total strength of legs.....	13.	9.4
Total strength of arms.....	8.	4.6
Total strength of trunk.....	8.	5.
Total strength of all the muscles of the body.....	30.	19.

Several facts of interest will be noted in the above comparative table. The total strength of the arm muscles in man is nearly two thirds that of the leg muscles, while in women it is only one half.

In both men and women the total strength of the arms is practically the same as that of the trunk and chest, the cause of which is readily understood when it is remembered that the vigorous use of the arm muscles requires fixation of the shoulders by contraction of the trunkal muscles.

Charts I and II are fair examples of the muscular type characteristic of women suffering from pelvic displacements. The low level of the figures indicating the strength of the anterior, posterior, and lateral muscles of the trunk, is a clear evidence of the feebleness of the development of these structures.

The only exceptions to this type found are those in which the displacement is clearly due to inflammatory processes or accidents at childbirth. In one hundred cases of pelvic visceral displacement taken without selection, I found the average total strength of the entire body to be 24 per cent less than that of the average woman, while the total strength of the trunk muscles in the same persons was 35 per cent less than the average. These figures are simply the numerical expression of the same fact which is graphically shown in Charts I and II.

In Chart II the total strength is above the average, which is found in the middle line of the chart. This unusual circumstance was due to the fact that the person was a teacher of gymnastics, who had by her exercise acquired a considerable degree of strength, although her crippled condition, due to the wearing of the ordinary dress, had prevented proper development of the muscles of the trunk. The weakness of the legs shown in Chart I was due to the fact that the patient,

in addition to a complete retroversion, had been obliged to keep her bed for a considerable portion of the time for a number of months, owing to an inflammatory disease of the ovaries. In the great majority of cases the anterior trunk muscles are found to be disproportionately weak as compared with the posterior muscles, as is seen in Chart I, in which, however, this characteristic is not so marked as in a large proportion of cases.

Every experienced gynecologist must have noted the frequent association of pelvic diseases with changes in the external conformation of the body. The employment of various forms of abdominal supports in the treatment of uterine displacements, is a recognition of the relation between abnormal static conditions of the abdominal viscera, and a similar condition of the viscera of the pelvis.

The Relation of the External Form of the Trunk to Visceral Prolapse.—Quite a number of years ago I began the study of the relation of deviations from the normal state in the outlines of the body to various forms of pelvic and abdominal diseases by the aid of a simple apparatus which I had constructed for the purpose, by means of which it is possible to make an exact profile of the body in an upright position in any plane. The apparatus consists of the following parts: 1. A frame attached to a close back of proper width and height, the upright bars in front of the back of the apparatus being exactly parallel with it; 2. A pencil carrier which is placed against, and made to move upon, the two uprights in any position in a plane parallel with the back. The pencil carrier is always at exactly right angles with the back. In preparing the apparatus for use, a piece of strong paper of proper size is fastened upon the back by means of thumb tacks. The patient is then made to stand with the back against the paper, with the heels, hips, and shoulders touching the paper, and the hands grasping the sides of the apparatus to secure absolute steadiness during the tracing. The patient is protected in the meantime by a sheet attached to a cord loosely tied about the neck, and when in place, the pencil carrier is placed in position, and an outline of the figure rapidly drawn. Another paper being placed in posi-

N. J.

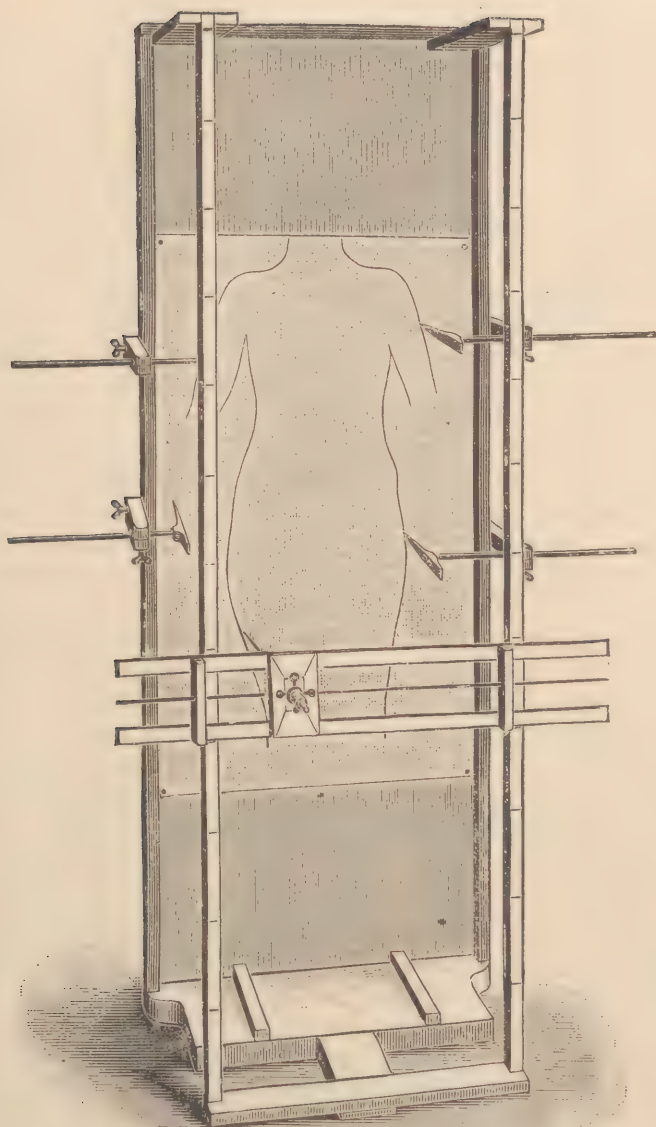


Fig. 2.—Apparatus for tracing an outline of the body.

tion, the side profile is taken in a similar manner. For convenience in measurement and to facilitate the location of the parts, the exact size and position of which it may be necessary to indicate upon the outline, a vernier is placed upon each one of the four uprights of the apparatus. By means of a leveling rod passed through the center of the pencil carrier, and used in connection with the vernier, it is possible to locate and represent exactly the position of any organ of the body. The outlines shown in connection with this paper were made with this apparatus, which is represented in Fig. 2. Fig. 5, page 12, shows the outlines of a healthy woman. Figures 1-4, 6-9, and 11-14, show outlines of women suffering from various forms of visceral displacement.

Relation of the Proportions of the Trunk to Visceral Prolapse.

— For some years I have made careful anthropometric studies of all my patients, making measurements according to the rules generally followed in observations of this kind. I have extended my study to the peasant women of various nationalities, especially French, German, Italian, and Chinese women, a single tribe of East Indian women, and the women of a number of the primitive American Indian tribes of Arizona, Old Mexico, and the Indian Territory. The studies which I have made in this direction have developed the fact that the waist of the average American woman is much smaller in proportion to the height than that of the savage or semi-civilized woman, or the women of other civilized nations. The following table briefly summarizes some of the results obtained :—

	Av. height	Av. waist	Av. waist percentage of height
American women.....*	61.94 in.	24.79 in.	40.
Telugu "	60.49	24.65	40.6
French " (peasants).....	61.01	28.00	45.4
Chinese "	57.85	26.27	45.4
Yuma "	66.56	36.84	55.2
Venus de Milo			47.6

The Telugu women of India, whose waist proportion is 40.6 per cent of the height, are the only race which approaches American women in the smallness of the waist, and Dr. Cummings, who made for me a considerable number of measurements of the women of this tribe, stated that it was

their custom to support the skirt, which forms their principal article of dress, by means of a cord tied about the waist and drawn as tightly as possible. This fact evidently explains the reason of the unusual smallness of waist in Telugu women, and suggests the cause of the same deformity in civilized American women, a peculiarity that is not exhibited by the aboriginal women of this country.

Mrs. Langtry, the famous English beauty, whose proportions were recently published, gives her height as 67 inches and her waist as 26 inches, a waist proportion of 38.8 per cent. If Mrs. Langtry is a representative of the women of her country, English women have still smaller waists than American women; but the average waist proportion of twelve English women, brick-makers, whom I measured a few years ago at Lye, in the so-called "black country" of England, I found to be 41.3 per cent, which is a trifle more than that of American women. The waist average proportion of 2000 men measured by Dr. Seaver, of Yale, I find to be 42.7 per cent, figures which are slightly exceeded by the proportion determined by my own measurements of men.

That this smallness of waist of the civilized woman is an acquired deformity, is evident from a study of the Venus de Milo and other ancient Grecian statues, in which I find the waist proportion to be very much greater than that of the civilized woman of the present day, and also by the recognized anatomical fact that the pelvis of the civilized woman is much broader than in women of savage tribes and semi-civilized nations. The physiological cause which gives rise to increased capacity of the pelvis in civilized women certainly would not at the same time produce a diminution in waist capacity.

Considering the abnormal smallness of waist in American women as an acquired deformity, we should expect to find this peculiarity of figure accompanied by a very considerable disturbance in the static relations of the abdominal viscera, especially when recalling the fact that all the solid viscera of the abdomen are placed at its upper part, and are included within that zone of the trunk usually termed the waist, so that the smallness of the waist would indicate either a corre-



Fig. 1. Reformed corset wearer.



Fig. 2. The same with corset.



Fig. 3. Young woman whose "clothes were never tight."



Fig. 4. Side view of same.

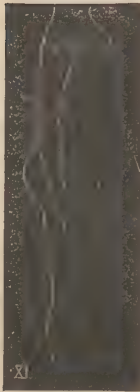


Fig. 5. A German peasant woman.



Fig. 6. Effects of corsets and tight bands, on an American woman of same age.



Fig. 7. Effects of tight bands and heavy skirts.

PLATE I. — DEFORMITIES RESULTING



Fig. 8. Front view of same.



Fig. 9. Effects of corset-wearing and tight bands.



Fig. 10. Man who had worn a belt.



Fig. 11. Effects of a "health corset."



Fig. 12. Front view of same.



Fig. 13. Displaced spleen from corset-wearing.



Fig. 14. Front view of same.

FROM WAIST CONSTRICTION.

sponding diminution in the size of the viscera occupying this portion of the trunk, or a downward displacement of these organs.

Since a comparative study of the viscera of men and women shows that the liver, the principal viscus located in this region of the body, is proportionately larger in women than in men, it is evident that the only explanation of the smallness of the waist in civilized women is to be found in the lowering of the position of the organs of the lower trunk cavity and not a diminution in size.

Another evidence of deformity of the figure associated with prolapse of the viscera of the trunk, is the lowered position of the umbilicus. The extensive researches of Dr. Giovanni, recently published by him in a remarkable work upon the morphology of the human body, have established the normal position of the umbilicus as midway between the lower extremity of the sternum and the pubes, not including the xiphoid cartilage. In one hundred cases of displacement of the pelvic viscera, I found the umbilicus to be, on an average, one inch below the normal position, due to the sagging of the bowels. This observation agrees with that of Mr. Lockwood, of St. Bartholomew's Hospital, in London, who has shown by elaborate post-mortem studies, that hernia is accompanied with prolapse of the mesentery and the attached bowel to the extent of four to nine inches. Mr. Lockwood, in a public address upon the subject, called attention to the influence of tight lacing in producing this prolapse in women.

Relative Frequency of Displacement of the Abdominal and Pelvic Viscera.—By a study of the position of the abdominal and pelvic viscera in relation to each other and to their normal position, and with special reference to the normal configuration of the body, I have noted some facts which have been to me of very great interest, and which seem to agree fully with the views above presented. Figures 1-4 and 7-14 present typical examples of a large number of cases which I have met, and show both the general configuration of the body and the position of the principal viscera of the lower cavity of the trunk. The association of a small or

flat waist and prominent abdomen with displaced viscera is extremely constant in my observations.

In a series of 517 cases of women suffering from visceral prolapse affecting either the organs of the abdomen or pelvis, studied with reference to the relative frequency of static disturbances of the abdominal or pelvic viscera respectively, my observations were as follows : —

Cases of marked displacement of abdominal viscera (stomach, colon, liver, kidneys, spleen).....	479.
Cases of displacement of the pelvic viscera.....	276.
Cases of displacement of abdominal viscera without displacement of pelvic viscera.....	241.
Cases of displacement of the pelvic viscera without displacement of the abdominal viscera.....	38.
Per cent of cases of prolapse of abdominal viscera without displacement of pelvic viscera.....	50.3
Per cent of cases of displacement of the pelvic viscera without displacement of the abdominal viscera.....	13.

The particulars respecting the displacement of the abdominal viscera are as follows : —

Cases of prolapse and dilatation of the stomach and prolapse of the colon (the stomach being considered dilated or prolapsed when the lower border reaches the umbilicus, as determined by clapping).....	382.
Cases in which one or both kidneys were distinctly movable and floating, usually the right.....	203.
Cases of marked downward displacement of the liver.....	16.

It is hardly necessary to comment upon the above figures, as they show so clearly a very positive and intimate relation between visceral displacements in the pelvis and the same condition in the abdomen. It seems to be a legitimate conclusion from the facts above presented that visceral displacements of the pelvis are not usually a disease of this region of the body alone, but are simply a local expression of a general disorder, which affects more or less extensively the entire viscera of the trunk below the diaphragm. The great frequency with which displacements of the abdominal viscera are found when attention is directed to the static relations of these organs as compared with static disturbances of the pelvic viscera, is quite in harmony with the anatomical fact that the pelvic viscera are surrounded with much more efficient safeguards against displacements than are the viscera of the abdomen.

A careful analysis of the symptoms presented in several thousand cases of women presenting distinct evidences of pelvic disease, has convinced me that a large share of the nervous and other functional disorders from which these patients suffer, are due not so much to the pelvic disorders themselves, especially in cases of displacement of the pelvic viscera, as to the condition of general visceral prolapse involving nearly all the organs of the lower half of the trunk.

Dr. Trastour has clearly shown the important relation of the normal *statique abdominale* to health in both men and women. Any considerable change in the static relations of the abdominal viscera results in disease as certainly as does a similar disturbance of the pelvic viscera. The strain upon, and the constant irritation of, the great sympathetic centers of the abdominal region, resulting from displacement of the colon, kidneys, or liver, is a constant source of reflex irritability, which, acting first upon the great centers of the brain and spinal cord, may be reflected to any or all parts of the peripheral nerve ramifications. That such an irritation exists is shown by the fact that tenderness of the solar plexus, of one or both of the lumbar ganglia, or of the lumbo-aortic plexus, either one or all of the conditions named, was found in a large proportion of the total number of cases to which the above statistics relate. It is doubtless true that in some of these cases the irritation of the sympathetic ganglia may have been the result of peripheral irritation in the pelvic viscera; but that irritation of the ganglia is not generally the result of peripheral irritation in the pelvis is evidenced by the frequency with which a hyperæsthetic state is encountered in women who present no abnormal condition of the pelvic viscera, and in men equally free from pelvic disease.

Prolapse of the organs of the abdominal cavity necessarily tends to produce displacements of the pelvic organs, although it is surprising to note with what obstinacy the viscera of the pelvis not infrequently resist the disturbing influences of the extensive static disturbances of the viscera of the abdomen. How displacements of the stomach, colon, liver, or kidneys may occasion disease is a pathological question which need not here be discussed, since the perversions of the tissue meta-

morphosis naturally resulting from a disturbance in the blood supply, and from the development of abnormal and pernicious nerve reflexes, are etiological factors, the influence of which is well known, and which are certain to come into action in an organ crowded by abnormal pressure out of its proper place. Prolapsed intestines become congested, and not infrequently a pseudo-stricture of the large intestine is occasioned by a folding of the viscus upon itself. Stasis of the contents of the intestines leads to fecal accumulation and consequent dilatation and atony, and thus the causes which tend to produce visceral displacements in the pelvis are accumulated and aggravated.

Causes of Visceral Displacement.— Respecting the causes of visceral displacements of the abdomen and pelvis, I believe that too much attention has generally been given to etiological factors, which though in themselves potent causes of static disturbance, are not infrequently, and even usually, the results of other causes more fundamental in character, but which are commonly overlooked.

As regards American women, I have become quite convinced that the principal predisposing causes of visceral prolapse in the abdomen and pelvis are, first, an unhealthful mode of dress in which the central portion of the trunk is abnormally constricted; and secondly, a neglect to secure by proper muscular exercise that vigorous and symmetrical physical development which is essential to the health of the entire body as well as that of the organs which occupy the cavity of the trunk below the diaphragm. In referring to the pernicious influences of the ordinary civilized dress, I do not speak of tight-lacing for the reason that the dress worn by the civilized woman is, with the rarest exceptions, universally open to criticism on the ground of abnormal pressure upon the abdominal contents. Women rarely admit themselves to be guilty of tight lacing. But even in the cases of those who consider themselves examples of moderation in this respect, the tapeline drawn about the waist will disclose the fact that the clothing fits the form so tightly that the amount of room left for expansion in breathing is scarcely a quarter or a half of an inch, and in many cases even less. It is not tight lacing which

does the great majority of civilized women injury, but a dress which fits the form so snugly in the narrow zone of the waist that the increased thoracic space demanded in respiration can be secured only by a downward displacement of the viscera to an abnormal extent.

The injury resulting from the mode of dress common among civilized women, is chiefly due, first, to mechanical displacements through constriction of the trunk in its most yielding part ; and secondly, interference with respiration.

In Figures 1-4 and 6-14 are shown the deforming influence of waist constriction and the displacing influence of heavy skirts hanging upon the waistbands, which, though often loose when applied to the body, become tight by the downward traction of their weight, and exert a powerful displacing influence upon the viscera.

I recently made a comparative study of the effects of the common dress of men and women, selecting for the purpose 71 working women and 50 working men, all of whom were in ordinary health.

In the 71 women examined, prolapsus of the stomach and bowels was found in 56 cases. In 19 of these cases the right kidney was found prolapsed or movable, and in one case, both kidneys. The 15 cases in which the stomach and bowels were not prolapsed were all persons under 24 years of age. None of these had ever laced tightly, and four had never worn corsets or tight waistbands, having always worn clothing suspended from the shoulders. It is noticeable that in a number of cases in which corsets had never been worn, tight waistbands had produced very extensive displacement of the stomach, bowels, and kidneys. In one of these the liver was displaced downward.

In the 50 men were found only six in whom the stomach and bowels could be said to be prolapsed. In one the right kidney was prolapsed. In only three was the degree of prolapse anything at all comparable with that observed in the women, and in these three (and in one other of the six cases, making four in all), it was found on inquiry that a belt or something equivalent had been worn as a means of sustaining the pantaloons. In one case the patient attributed

his condition to the wearing of a truss supported by a belt drawn tightly about his waist. This belt had been worn a sufficiently long time to be an ample cause for the displacements observed. In the two cases of slight visceral prolapse in which belts had been worn, there was considerable deformity of figure, due to general weakness, and the habit of standing with the weight upon one foot. By comparison, we see the relative frequency of visceral prolapse in the men and women examined, was 12 per cent for the men and 80 per cent for the women. In other words, visceral prolapse was found to be six and three-fourths times as frequent in women as in men. It is also noticeable that, with the exception of two cases, visceral prolapse in men was due to the same cause which produced visceral prolapse in women; viz., constriction of the waist. It makes no difference, of course, whether the constriction is applied by means of a corset, a waistband, or a belt.

I have met a number of cases of visceral prolapse in men in which the disease was directly traceable to the wearing of a belt. One case was that of a military officer who wore a tight sword belt by which he carried almost constantly a heavy sword. I have observed one case of prolapse of the kidneys in a blacksmith in which it was due to the practice common among this class of mechanics of sustaining their pantaloons by means of the strings of their leather aprons tied tightly about the waist, the suspenders being loosened so as to give greater freedom to the movements of their arms. Leaving out of consideration the four cases of men in whom the visceral displacement was due to the same causes which produce this morbid condition in women, I find but two cases in which the viscera had become displaced from other causes, or one in twenty-five,—a frequency just one twentieth of that in which this diseased condition is found in women who consider themselves in ordinary health.

The downward displacement of the abdominal viscera resulting from limitation of the waist movements in respiration, is shown in Fig. 2. This effect becomes especially apparent in forced respiration. Normally the lower abdomen is slightly drawn in at the end of a full inspiratory effort;

but when the waist is so disabled by a corset or bands that normal expansion in this region cannot occur, the increased thoracic inspiration can be acquired only by downward displacement of the viscera, which is increased by the exaggeration of the intra-abdominal pressure resulting from the increased respiratory effort required to secure the needed amount of air.

Amount of Pressure Exerted by Tight Bands and Corsets.—As the result of a large number of observations, I have found the average pressure exerted at the waist by a tight corset or tight waistbands to be, in ordinary respiration, about .3 of an inch of mercury. The measurements were made by means of a mercurial manometer. In forced respiration, I found the pressure exceedingly variable, ranging from one to twenty inches, the equivalent of which in pounds is about one half to ten pounds per square inch. In taking these measurements, the rubber bulb connected with the dynamometer was placed underneath the corset next to the body, and, of course, the results given do not represent accurately the amount of pressure exerted within the abdominal cavity or pelvis; nor is it to be supposed that the force indicated is exerted on every square inch of the entire area of the corset, but only over the area of the greatest constriction.

A Study of the Influence of Waist Constriction, by Graphic Methods.—The observations were made by means of an air pessary with a recording tambour, the movements of which were registered upon a kymographion in the usual manner.

Plate II, Fig. 1, exhibits the movement of the pelvic organs produced by respiration, ordinary and forced, in a patient in a horizontal position, and without constricting bands of any sort.

Plate II, Fig. 2, shows the movement of the pelvic organs, resulting from ordinary and forced respiration, patient horizontal, as before, but wearing a corset moderately tight. The difference between the two tracings is noticeable in that the movement of the pelvic organs is less when the corset is tight than when it is loose. The reason for this is made apparent by the tracing shown in Fig. 3, Plate II, the first part of which shows ordinary respiration without a corset; the last part, ordinary respiration after the corset had been

Ordinary.

Forced.



Fig. 1. Respiratory Tracing (Vaginal).

Ordinary.

Forced.



Fig. 2. Vaginal Tracing with Corset.

Without Corset.

Tightening Corset.

With Corset.



Fig. 3. With and without Corset.

With Corset.

Without Corset.



Fig. 4. Coughing (Vaginal Tracing).

PLATE II.

GRAPHIC REPRESENTATION OF THE EFFECT OF WAIST CONSTRUCTION UPON INTRA-ABDOMINAL PRESSURE.

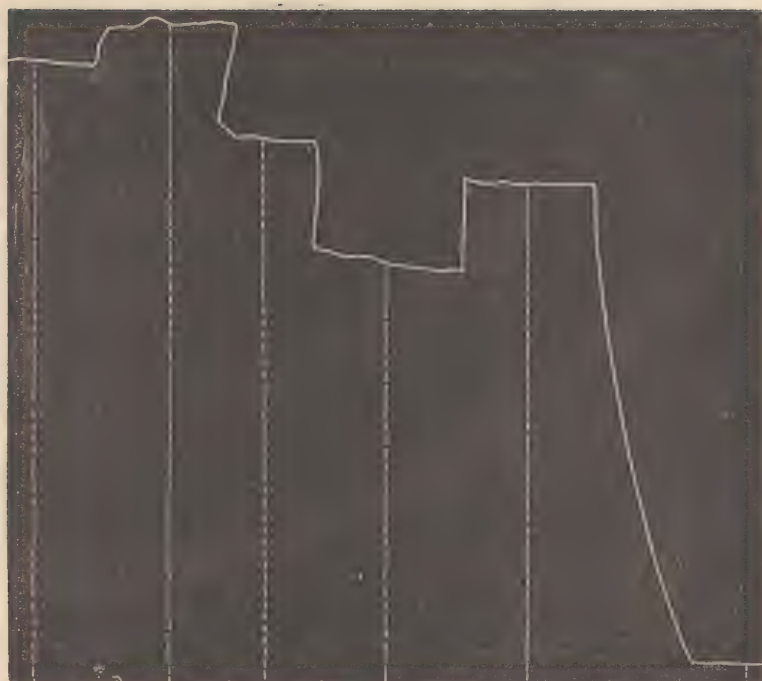
applied. The sudden elevation in the center of the tracing indicates the downward movement of the pelvic organs occasioned by the tightening of the corset.

Plate II, Fig. 4, shows the same thing, and also exhibits the influence of coughing upon the pelvic organs. The enormous curve produced in the act of coughing indicates a corresponding amount of displacement of the uterus and its adnexa in a downward direction. Another point in this tracing to which I wish to direct attention, is the greater amplitude of movement when the corset was loosened, which coincides with what is learned by comparison of the tracings shown in Figs. 1 and 2, or the first and last portions of Fig. 3. This lessened amplitude of movement at first surprised me; but on consideration, the reason is plain. It is due to two causes:

1. The compression of the abdominal wall crowds a portion of the abdominal contents upward, while another portion is crowded downward. By this displacement of the viscera the movements of the diaphragm are restricted. This muscle not being able to descend to the usual degree, there is less movement of the pelvic viscera than without the corset.
2. The degree of easy mobility of the uterus in the direction of the longitudinal axis of the body is lessened by the compression of the corset, as shown by Fig. 3. Consequently the excursions produced by ordinary respiratory movements, or by the extraordinary movements of forced respiration, coughing, etc., are necessarily more limited under the restricting influence of the corset than without it.

Plate III, Fig. 1, shows the relative influence of different positions of the body upon intra-pelvic pressure. It will be noticed that the greatest change in pressure occurs in rising from the horizontal to a vertical position, and in assuming the genu-pectoral position. The facts elicited by the tracing agree precisely with what have been held as accepted facts, but for which heretofore we have had no scientific or exact representation, for which reason, chiefly, I offer them as being of interest.

Plate III, Fig. 2, exhibits the influence of certain movements of the body upon intra-pelvic pressure. It is noticeable that bending backward increases the pressure, while bending for-



Standing. Sitting. Lying on Back. Lying on Side. Lying on Face. Knee-chest Position

Fig. 1. Influence of Position on Intra-pelvic Pressure.

Backward.

Forward.

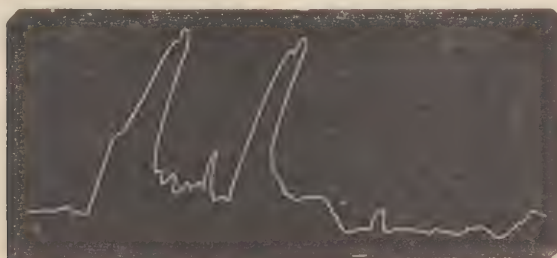


Fig. 2. Influence of Bodily Movements upon Intra-pelvic Pressure.

Costal.

Abdominal.

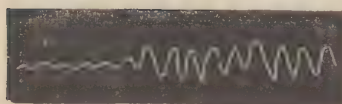


Fig. 3. Woman a Week before Confinement.

Costal.

Abdominal.

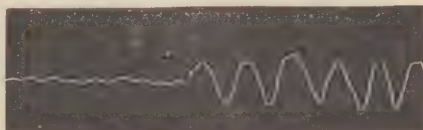


Fig. 4. Man with Enlarged Spleen.

ward lessens the pressure. Under the influence of a tight corset, the degree of pressure induced by bending backward was increased, while the decrease of pressure in bending forward was greatly lessened, or was more than neutralized by the pressure of the corset upon the lower portion of the abdomen.

The facts elicited by my observations of the respiratory movements of the pelvic viscera present themselves as follows : —

1. There is a normal movement of the pelvic viscera corresponding to those of respiration.

2. These movements are lessened by the constriction of the waist, inducing the costal type of respiration, as the result of two factors, (*a*) the lessened movements of the diaphragm, and (*b*) the downward displacement produced by the pressure of the corset upon the abdominal walls.

Effect of Constriction of the Waist upon Intra-pelvic Pressure.—The tracings which I have exhibited show merely relative pressures. In order to obtain at least an approximate idea of the amount of pressure to which the pelvic organs are normally subjected, and to which they are subjected by the wearing of a corset or other constricting articles of dress, I have made a number of observations by means of a mercurial dynamometer, adapted to the purpose. In using the instrument for testing intra-pelvic pressure, I filled with water the bulb of an ordinary air pessary previously placed in the vagina, and connected it with the cistern of the dynamometer. I have made many measurements with this instrument in this manner, and have obtained some most interesting results, which I have tabulated. Without reviewing the whole number of measurements recorded in my tables, I will present the following, which have a most important relation to the subject under consideration : —

(The measurements were taken with the patient in three positions, lying, sitting, and standing, and both with and without a corset in all these various positions.)

In a case which may be considered an average one (a young woman of twenty years of age) starting with an initial pressure of eight tenths of an inch of mercury, with the patient lying down, the mercurial column was raised in ordinary

Expiration. Inspiration.

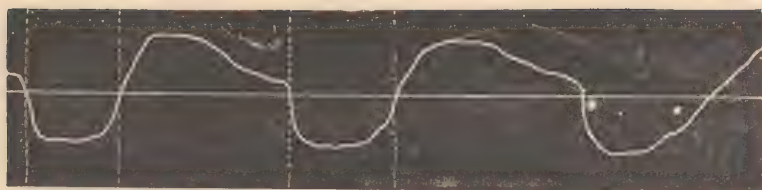


Fig. 1. Pneographic Tracing of a Healthy Woman.

Expiration. Inspiration.

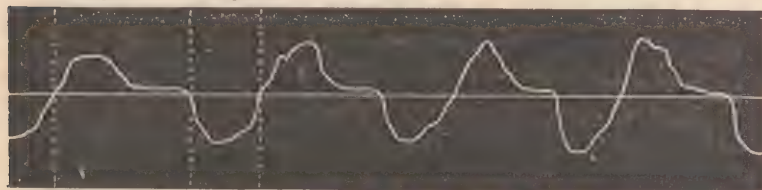


Fig. 2. Pneographic Tracing — Woman in Corset.

Costal. Waist.

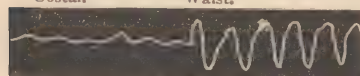


Fig. 3. Man.

Costal. Waist.

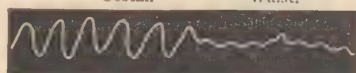


Fig. 4. Woman in Corset.

Costal. Waist.

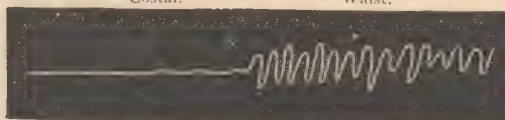


Fig. 5. Chippewa Indian Woman.

Costal. Waist.



Fig. 6. Woman Who Never Wore a Corset.

Costal. Waist.

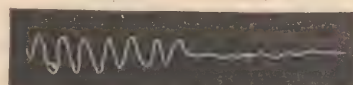


Fig. 7. Man in Corset.

Costal.

Waist.

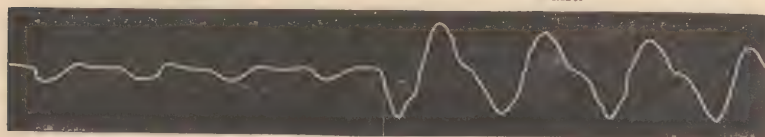


Fig. 8. Dog.

Costal

Waist.

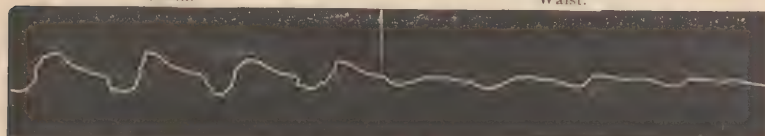


Fig. 9. Dog with Corset on.

PLATE IV.

GRAPHIC REPRESENTATION OF THE EFFECTS OF WAIST CONSTRICTION
UPON BREATHING MOVEMENTS.

breathing from .01 to .05 of an inch by each respiratory movement. In forcible respiration, the mercurial column was raised from .35 to 1.7 inches.

Such acts as laughing, coughing, or blowing the nose raised the mercurial column from 1 to 4. 1 inches. When the initial pressure was 1. 5 inches, bending forward lowered the column from .0 to .5 inches; bending backward raised it .2 inches.

On tightening the corset, the mercurial column was raised .5 of an inch; in forced respiration, from .2 to .5.

Rising to a standing position, the initial pressure increased .5 inches, and other pressures increased in proportion. I have not yet pursued these studies as far as I desire to do, and hope to perfect my apparatus so as to be able to obtain a very accurate idea of intra-pelvic pressures, and the extent to which aberrations from the average normal pressures are possible; but I think I have, at least, shown that variations in pressure, corresponding to the tracings made by the recording tambour and kymographion, represent changes which are very considerable in degree and of important pathological import. This will be more fully appreciated, perhaps, when it is remembered that an inch of mercury represents about one half pound of pressure, and that even so small a pressure as .5 of an inch of mercury, or four ounces avoirdupois, amounts to a very considerable aggregate when applied to each square inch of the pelvic floor.



Fig. 3. Instrument for Measuring Vertical Movements of the Uterus.

Direct Measurement of the Amount of Displacement of the Uterus Induced by Constriction of the Waist, etc.—Finding no convenient method of measuring the actual amount of movement of the uterus along the axis of the body, I devised an instrument (Fig. 3) by means of which the movements of the uterus in relation to the longitudinal axis of the body are so magnified as to render apparent slight movements of ascent or

descent which might otherwise escape detection. The action of the instrument will be easily understood from the accompanying cut. By means of this instrument, I find that the movements of the uterus up and down in ordinary breathing are from .1 to .3 of an inch. Coughing or deep breathing, straining, and similar movements may increase this to .5 of an inch. By the application of the corset, or other constricting means, I find the uterus is lowered in the pelvis from .2 to .5 of an inch.

By means of another instrument, shown in Fig. 4, which I have constructed for the purpose, I have undertaken to measure the amount of displacement of the abdominal viscera through waist constriction, by observing the changes in the position of the perineum in relation to the longitudinal axis of the body under the influence of pressure. The instrument consists simply of a lever sustained by an upright and adjustable support, furnished with a vernier,



Fig. 4. Instrument for Measuring Movements of the Perineum.

against which the end of the long arm of the lever plays while the short arm is applied to the perineum. The fulcrum of the lever is so placed that the recording end of the lever has an amplitude of movement just five times that of the end placed against the pelvic floor. The instrument can be used with the patient lying or standing. By use of this instrument, I find that lacing of the corset as tight as ordinarily worn, depresses the pelvic floor from five to twelve millimeters. I have sometimes observed a rise in the pelvic floor, of fifteen millimeters immediately after the corset was loosened.

The interference of waist constriction with respiration is

also evident from a study of the tracings shown in Figs. 1 and 2, Plate IV, which were obtained by means of a pneograph, shown in Fig. 5. This instrument consists essentially of two chambers separated by a diaphragm of thin rubber. One of these chambers is connected with a recording tambour which writes upon a sheet of smoked paper carried by a revolving cylinder such as is used with the ordinary pneumograph. With the other chamber is connected a breathing mask, which in use is placed over the mouth and nose: This chamber is

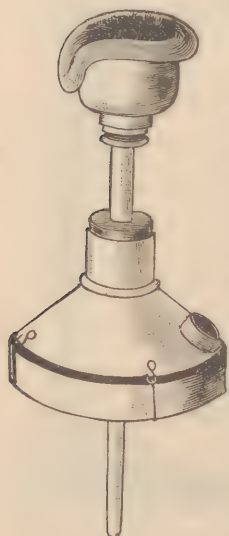


Fig. 5. Pneograph.

provided with a second opening, the size of which is controlled by a shutter, which can be adjusted at will. In use, the patient under examination breathes into this chamber, which may be called the breathing chamber of the instrument. With the chamber completely closed, the breath would simply pass from the mouth into the chamber and back again, there being no change of air, but with the shutter open, the air is drawn into the chamber with each inhalation and expelled at each exhalation. The resistance which the air meets in passing through the shuttered opening gives rise to changes in pressure within the breathing chamber, the pressure being diminished during inspiration and increased during expiration. The amount of this change in pressure will depend

in part upon the size of the opening, and can be measured by connecting the breathing chamber with a water column. The average pressure which I have observed is equivalent to a column of water one half inch in height. This is certainly an amount too small seriously to modify the form of the respiratory movements.

The changes in pressure in the breathing chamber of course give rise to movements of the rubber diaphragm separating the two chambers of the instrument. These movements actuate in turn the diaphragm of the recording tambour, which writes upon the recording cylinder in the usual way. That

portion of the curve above the base line represents expiration, that below, inspiration. The difference between the curves shown in Fig. 1 and those in Fig. 2, Plate IV, suggests the interference with respiration through the increase of abdominal pressure resulting from waist constriction.

Gynecologists have often called attention to the baneful influence of high heels in producing pelvic disease. Many of the outline tracings which I have made, very clearly confirm this opinion. Forward carriage of the hips results in a depression of the chest and in an increase of the normal posterior dorsal curve, lessens the chest capacity, and depresses the viscera which occupy that portion of the trunk lying between the diaphragm and the lower part of the ribs.

Prof. Dr. E. Meinert, of Dresden, kindly sent me a few months ago a number of photographs in which the evil effects of waist constriction in causing visceral displacement is very clearly shown by outlines traced on the skin. In a letter accompanying the photographs, Dr. Meinert, who had seen some of the outline tracings which I have made, kindly says, "So far as I have made studies in the same direction, I can verify your opinions on every point."

Dr. Meinert's method of investigation is a very original and ingenious one, and possesses the merit of accuracy in the highest degree.

Injuries Resulting from the Common Mode of Dress through Interference with Normal Respiration.—What is normal respiration in a woman?—Thirteen years ago, in a published article upon this subject, I wrote as follows:—

"It is undoubtedly true that most women do breathe almost exclusively with the upper part of the chest; but whether this is a natural peculiarity, or an acquired and unnatural one, is a question which I am decidedly inclined to answer in harmony with the latter supposition, basing my conclusion upon the following facts:—

"1. In childhood, and until about the age of puberty, respiration in the boy and girl is exactly the same.

"2. Although there is a change in the mode of respiration in most females, usually soon after the period of puberty, marked by increased costal respiration, and diminished ab-

dominal or deep respiration, this change can be accounted for on other than physiological grounds.

“3. I believe the cause of this modification of respiration is the change in dress which is usually made about the time of puberty. The young girl is now becoming a woman, and must acquire the art of lacing, wearing corsets, stays, and sundry other contrivances which will aid in producing a fine form.

“4. I have met a number of ladies whose good fortune and good sense had delivered them from the disturbing influence of corset-wearing and tight-lacing, and have invariably observed that they are as capable of deep respiration as men, and practice it naturally.”

I am thoroughly convinced that this so-called physiological difference between man and woman is really a pathological rather than a physiological difference. In short, I believe that the only reason why women do not, under ordinary circumstances, breathe as do men, is simply that they cannot breathe naturally.

Five years ago, I improved the opportunity afforded by a journey through the western portion of the United States, to take pneumographic tracings of the breathing movements of the women of various Indian tribes, together with more than twenty Chinese women in San Francisco, Cal. I have also obtained graphic representations of the breathing movements of the lower animals, chiefly those of dogs. The results, some of which are presented in Plates III and IV, show most conclusively that there is but one normal type of respiration in human beings, and that the so-called “female type” of respiration is only the result of a mode of dress which restricts the natural respiratory movements of the lower portion of the chest. It is a mistake, however, to consider abdominal respiration as the natural mode of breathing in either men or women. In normal respiration, the chief movement of the chest is neither in the upper thoracic region, nor that which has been denominated abdominal respiration. The principal movement of the chest is in the inferior costal region. The anatomical structure of the skeleton and the arrangement of the muscles and their relation to the chest naturally give to this portion of the thoracic cage the greatest degree of mobility. It is, in fact,

only by expansion of the lower portion of the chest that the diaphragm can act efficiently in increasing the thoracic capacity in the longitudinal diameter. The action in normal breathing begins with expansion, first of the sides, then in front, then a slight elevation of the upper chest, and, in forced respiration, a slight drawing in of the lower abdomen at the same time. In ordinary respiration, there is simply a lifting forward of the whole front wall of the chest and abdomen, the movement extending all along the line from the upper end of the sternum to the pubes.

The so-called abdominal respiration is not only unnatural but unhealthful; indeed, it has been, in many cases, productive of serious injury.

Correct breathing is as necessary to the health of the pelvic and abdominal viscera as to a healthy condition of the lungs; for the inspiratory act not only pumps air in and out of the body, but draws blood to the heart, assisting particularly the portal circulation, and thus also aiding in the absorption of the products of digestion, and so facilitating the digestive process. It is quite possible, also, that the rhythmical movements imparted to all the viscera of the trunk by normal respiration are a sort of vital gymnastics, essential to the health of each organ. The effect of inspiration is to increase abdominal tension. This is accomplished by the flattening of the diaphragm, which is facilitated by the increase in the lateral transverse diameter of the lower part of the chest, induced by contraction of the inspiratory muscles. The effect of the increased abdominal tension is to facilitate the emptying of the veins of the portal circulation, in which there is a natural tendency to congestion, as the result of the resistance of the hepatic capillary system, which intervenes between them and the general venous system. In normal respiration, in which the intra-thoracic pressure is diminished to the necessary degree by proper expansion of the chest cavity, the emptying of the portal circulation is greatly facilitated.

When the waist is constricted, both elements of the respiratory process through which the abdominal and pelvic circulation is assisted are seriously weakened. The increase of the abdominal tension, resulting from the pressure of the diaphragm, is

prevented by the fact that the transverse diameter of the lower portion of the chest is not only diminished, but fixed. The lateral attachments of the diaphragm are thus approached in such a manner that this muscle is rendered incapable of efficient contraction. At the same time, the intra-thoracic negative pressure is diminished through the crippling of the inspiratory act. The lower portion of the chest being held firmly, any increase in the transverse diameter of this part is impossible. The normal descent of the diaphragm being prevented, the longitudinal diameter of the chest cannot be increased to the proper extent. In consequence of the constriction and the compression of the abdominal walls by the corset, the inspiratory force is largely expended upon the organs of the pelvis, which are forced down out of position. The pelvic floor is more yielding than the rigid walls of the upper chest, and is depressed, thus laying the foundation for chronic displacement. A civilized woman, wearing the ordinary dress, cannot expand her waist more than one fourth of an inch when taking a deep inspiration. Expansion must occur somewhere, and the abnormal mode of dress necessitates that it shall be at the upper and lower extremities of the trunk. The greater resistance of the upper ribs, and the yielding character of the structures which form the pelvis, lead to a lowering of all the organs which are dependent upon the latter for support.

The injuries resulting from abnormal breathing movements do not require for their production an extreme degree of waist constriction. They are commonly met with as the result of the ordinary mode of dress, the wearers of which would doubtless defend themselves against the charge of "lacing." It is only necessary that the clothes should fit the body snugly when the chest is in repose, to bring into play all the disturbing forces to which attention has been called, as soon as increased muscular activity produces deeper or more vigorous respiratory movements than usual, and consequently a demand for more waist room.

Muscular Weakness as a Cause of Visceral Prolapse.—The general neglect of such exercise as will result in a vigorous and symmetrical development of the muscular system prevalent

among women addicted to waist constriction, is a natural result of the interference with muscular activity which the wearing of such a dress involves.

By the inactivity of the muscles of the trunk and the failure of development due to continued pressure, the muscles of the central and anterior portions of the trunk become abnormally weak, so that their natural tone is insufficient to support the abdominal contents in their normal position. An additional injury results from the failure of these weakened muscles to perform their duty as guys, which balance the upper half of the pelvis upon the trunk, and by their efficient action in health maintain a graceful and healthful poise of the body.

The strong and beautiful curves which are observed in a spirited horse are not only attractive from an aesthetic point of view, but are also of the highest significance from a physiological standpoint. In the healthy, vigorous animal, one observes that the head is held high, the neck and back strongly curved, the limbs firmly set, and the whole expression indicates vigor and strength. The same is equally true of the human body. An erect head, well curved back, prominent chest, retracted abdomen, and firmly set limbs are indicative of an energized carriage of the body which is characteristic of health. The flat chest, posterior dorsal curve, projecting chin, and protruding abdomen are equally indicative of a relaxed and weak carriage of the body, characteristic of feebleness and disease. The spiritless and tired horse does not hold his head down; he lacks the vigor and disposition to hold it up. So the woman who has been accustomed to the support of stays of steel or bone finds herself, when without these means of support, feeling, as she says, as though she would fall into pieces. The muscles of the waist lack the ability to balance the chest and shoulders upon the hips.

The direct effect of the corset, and of any constriction of the waist, is to break down the natural curves of the back, straightening the spine, thus depressing the chest, and causing the shoulders to fall forward, and producing general collapse of the front wall of the trunk.

In consequence of the weakening of the muscles which support the trunk, and especially weakness of the waist muscles,

an ungraceful and unnatural carriage of the body appears, not only in walking and standing, but in sitting. The weak-waisted woman is comfortable only when sitting in a rocking or easy chair. She cannot be comfortable unless the back is supported ; consequently, in sitting, the muscles of the trunk are completely relaxed, thus causing collapse of the waist and protrusion of the lower abdomen by the compression at the waist occasioned by the depression of the ribs.

Such persons, in standing, assume a great variety of awkward and unhealthful positions. The most common faults are, dropping the shoulders, projecting the chin, hips too far forward, weight resting upon the heels or upon one foot, and a general lack of even and graceful balance of the body. In walking, the forward position of the hips makes it impossible to plant the whole sole of the foot down at once and firmly, so the weight is thrust continually upon the heels. This difficulty is increased by wearing high-heeléd shoes. A swinging, swaying, wriggling, or otherwise awkward gait is the most common mode of walking one sees in women, very few of whom are good walkers, in consequence of the inability to balance the body well, through weakness of the muscles of the waist.

The extreme frequency of spinal curvatures of various forms in woman and their comparative infrequency in men is an evidence of the prevalent weakness of the muscles of the trunk in women, which results from their neglect of active physical exercise ; at least this is true of American women. A notable degree of spinal curvature, sufficient to produce asymmetry of the body, may be found in the great majority of American women.

I made recently a careful examination, with special reference to bodily symmetry, of 200 students in attendance at a college, seventy-five of whom were young women and 125 young men. Of the young women, whose ages were from eighteen to thirty, only four were found who did not present some degree of lateral curvature of the spine, which in a number of instances was so exaggerated as to interfere seriously with respiration. Marked posterior curvature of the spine was prominent in a large proportion of the cases, especially in the middle and

upper dorsal region, resulting in forward carriage of the chest and head. Among the much larger number of young men, scarcely a dozen cases were found in which the spine was perceptibly curved, and only one very decided lateral curvature. The showing for the young men in this instance was, perhaps, unusually good, owing to the fact that they were largely from the country, and had been all their lives accustomed to active out-of-door work and sports.

Sir John Forbes, who has made quite extensive investigations upon this subject in schools for young women in England, records that on visiting a boarding school containing forty girls, he found, on close inquiry, that there was not one girl who had been in the school two years who was not more or less crooked, doubtless as the result of lack of muscular exercise.

An examination of the young ladies' seminaries in this country would doubtless disclose a similarly deformed condition of the young women students. The young woman who grows up in a rocking-chair or behind the ordinary school desk, cannot escape a greater or lesser degree of distortion of the trunk.

The Relation of Neglect of Exercise to the Function of the Round Ligaments.—I recorded in a paper presented at the annual meeting of the Association of Obstetricians and Gynecologists, in 1889, and published in the Transactions of the Society, observations concerning the function of the round ligaments, which showed that they are capable of voluntary contraction. The observations were made in the course of operations for shortening the ligaments, for the relief of retroversion. After carefully isolating a ligament, I applied, successively, a faradic, a galvanic, and a magneto-electric current, with the result of obtaining vigorous contraction in each case. The ligament contracted in such a manner that it was not only drawn back into the body, but was actually shortened in its length. I observed, also, that the contractions of the ligaments were nearly as vigorous when the electrodes were placed, one in the vagina, and the other on the abdominal wall a few inches from the ligament, as when they

were applied directly to the ligament itself. With the electrodes placed as described, an energetic contraction of the ligaments occurred whenever the abdominal muscles were made to contract by closing the circuit.

This observation led me to believe that the normal action of the round ligaments is as follows: The uterus being placed at such an angle with the longitudinal axis of the body that it rests upon the bladder, is brought forward and downward by such acts as coughing, lifting, straining, etc.; this tends to force the abdominal and pelvic contents downward through contraction of the abdominal muscles, by which also there is a tendency to crowd the uterus backward. When the fundus of the uterus falls backward to such a degree as to allow the top of the organ to be engaged by the intestines, it is usually crowded down upon the sacrum, and drags the ovaries after it. In a healthy woman, as I think my experiments, which were many times repeated, have clearly shown, the round ligaments contract with the abdominal muscles, and by taking up the slack in the ligaments which exists when they are in a passive state, these structures are rendered taut, and thus the uterus is saved from displacement.

[This view of the action of the round ligaments in connection with the abdominal muscles is confirmed by the fact which I have demonstrated, that the cremasteric reflex which causes elevation of the testicle in the male, in the female causes contraction of the muscular fibers lying just above Poupart's ligament and on either side of the inguinal canal.]

This view explains how it is that the muscular structures of the ligaments are maintained in a normal state. A muscle soon loses its efficiency when under constant strain. It becomes tired out, relaxed, and undergoes atrophic changes. The normal slack of the round ligaments, when their functional activity is not required, gives them an opportunity to rest. When their service is needed, the same nervous impulse which produces contraction of the abdominal muscles also brings into play the round ligaments. The slack of the ligaments is taken up, and the retreating uterus is snatched forward or caught in position in time to prevent its being forced back. In nearly 200 cases upon which I have operated for shortening the

round ligaments, I have, in a great number of cases, found these structures so attenuated and degenerated as to have no functional activity.

I have observed constantly that ligaments of this sort are found only in the cases of young women of very feeble muscular development, or those in whom the retro-displacement has existed for a number of years. Ligaments of the kind described will not contract under the stimulus of electricity, either faradic or galvanic, and hence are functionally dead.

It is evident, then, that neglect of physical exercise, particularly neglect to develop the muscles of the trunk, by which means alone the round ligaments can be developed, is a powerful predisposing factor in the production of certain forms of uterine displacement.

Therapeutic Indications.—If the observations which are recorded in this paper are admitted to be accurate (and I am glad to say that many of them are in accord with the results of the studies of Mays, Dickinson, Meinert, and others), it seems scarcely necessary to emphasize their importance as bearing upon the question of therapeutics in relation to displacements of the pelvic viscera, and more or less directly also in relation to many functional disorders of the organs of the pelvis. It is evident that medicated pledgets and pessaries, pelvic massage, local applications of electricity, and even operations upon the perineum, the vagina, the round ligaments, and I may also include ventral fixation, are measures capable of giving nothing more than temporary relief to a woman suffering from displacement of the pelvic viscera as a part of a general static disturbance which involves all the viscera below the diaphragm. And yet such are the means relied upon by the majority of physicians, for the relief of displaced pelvic organs. The “pessary mongers,” to borrow a phrase from Dr. Lawson Tait, have waxed rich through the production and sale of a vast variety of ingenious mechanical contrivances which are capable of affording nothing more than temporary relief and palliation, and then only in very exceptional cases, and which are certainly responsible for a vast amount of mischief-making.

Gynæcologists who undertake to cure women suffering from

uterine or ovarian displacements without correcting their mode of dress, commit the same error as would a donkey driver in attempting to help an overburdened and prostrated beast to his feet without first removing his excessive load.

A reform in dress must include the discarding of all bands and constrictions about the waist, and the adoption of garments light and sufficiently loose to allow the fullest and freest activity of the lungs, followed by carefully graduated and appropriate exercise. These measures are sufficient in themselves to accomplish a radical cure in a few cases of uterine and ovarian displacement, and, in the majority of cases, the relief afforded by these measures is very marked. Nevertheless, a radical cure requires, in the great majority of cases, a combination of hygienic measures with all the advantages afforded by gynæcological therapeutics, surgical and medical, which may be appropriate in any given case.

I do not plead for the substitution of healthful clothing and exercise for therapeutic measures, but that therapeutics alone shall not be relied upon for a cure of cases which demand a removal of causes and the building up, by natural agencies, of parts which are weak as the result of disease or lack of development.

Exercise inappropriately applied may be the means of great mischief in the treatment of this class of cases, causing as much harm as good, or even more, as has been done by the careless and unskilled prescription of exercise for women suffering from pelvic disorders. Sending a woman to a gymnasium with instruction to exercise, or telling her to exercise on general principles, without specific directions, is as absurd as to send a patient to a drug store with instruction to swallow medicine without any prescription respecting the kind or quantity. First of all, the specific weaknesses of the patient must be ascertained by careful physical examination, which shall include an exact test of the strength of the principal muscular groups of the body. A graphic representation of the results of such an examination, as I have shown in connection with this paper, which I believe embodies the first attempt of this sort that has ever been made, greatly facilitates the making of a proper prescription for exercise. It is only necessary that

the physician shall know what exercises are necessary for the best development of specific muscular groups to enable him to make at once a prescription exactly adapted to his patient's case, after he has obtained a graphic representation of her condition as regards muscular strength. A mere glance at the chart shows what is needed. The low points represent weak muscles; the high points, strong muscles. The distance between the low points and the high points represents the degree of muscular unbalance or asymmetry. The employment of such exercises as will strengthen the weak muscles and bring the low points up to the level of the high ones is all the patient requires. I have for nearly twenty years employed, with great satisfaction and success, the system of exercise commonly known as Swedish gymnastics. Both the medical and the pedagogical forms of this system are of the greatest possible service in the treatment of all forms of visceral displacement pertaining to the abdomen and pelvis, and indeed it appears to me next to impossible to treat successfully this class of patients without the aid of this valuable system.

I divide my patients into grades, or classes, according to the indications of the chart obtained for each. Special sets of exercise are prepared for each class, and in addition, special exercises with apparatus designed to meet still more exactly individual requirements, are prepared. The amount of daily work expressed in foot pounds required for each of the six classes, into some one of which most of my patients fall, is as follows:—

(1) 3600; (2) 7000; (3) 18,000; (4) 42,000; (5) 96,000; (6) 120,000.

The amount of work indicated for each class is increased, on an average, fifty per cent by the special prescription made to meet the requirements of each individual case. Various walking exercises and light leg movements, club swinging, and exercise with apparatus of various kinds are necessary measures for a hospital or sanitarium largely devoted to this class of patients. I have devised various forms of special apparatus in the effort to meet special requirements, one of the most useful of which is shown in Fig. 6, the operation of which will be easily understood. The weight lifted by the patient

consists of two cylinders partly filled with water. These cylinders are attached to an arm upon which they are rotated, on an axis supported by the upright standard. When not in use,



Fig. 6. Equalizing Apparatus for Exercising the Trunkal Muscles.

the cylinder hangs vertically. Grasping the handles while sitting in an upright position, chest well forward, the patient raises them, thus making the cylinder move through the anterior half of a circle, of which the elbow is the center. The

TABLE OF STRENGTH MEASUREMENTS.

Arranged from the Measurements of 100 Adult WOMEN, taken and compiled under the direction of J. H. KELLOGG, M. D., Battle Creek, Mich.

EXCEPT WHEN OTHERWISE INDICATED, QUANTITIES ARE EXPRESSED IN POUNDS AVOIRDUPOIS.

PER CENT	HEIGHT (Inches).	WEIGHT	ARMS.														LEGS														TRUNK.					RESPIRATION.					TOTAL STRENGTH.					PER CENT											
			R. Hand Flexors.	L. Hand Flexors.	R. Hand Extensors.	L. Hand Extensors.	R. Forearm Pronators.	L. Forearm Pronators.	R. Forearm Supinators.	L. Forearm Supinators.	R. Arm Flexors.	L. Arm Flexors.	R. Arm Extensors.	L. Arm Extensors.	R. Deltoid.	L. Deltoid.	R. Pectorals.	L. Pectorals.	R. Shoulder Retractors.	L. Shoulder Retractors.	R. Foot Flexors.	L. Foot Flexors.	R. Foot Extensors.	L. Foot Extensors.	R. Leg Flexors.	L. Leg Flexors.	R. Leg Extensors.	L. Leg Extensors.	R. Thigh Flexors.	L. Thigh Flexors.	R. Thigh Extensors.	L. Thigh Extensors.	R. Thigh Abductors.	L. Thigh Abductors.	R. Thigh Adductors.	L. Thigh Adductors.	Trunk Anterior.	Trunk Posterior.	Trunk R. Lateral.	Trunk L. Lateral.	Neck Anterior.	Neck Posterior.	Neck R. Lateral.	Neck L. Lateral.	Inspiration—Waist.		Inspiration—Chest.	Inspiration—Waist Expansion (in.).	Inspiration—Chest Expansion (in.).	Expiration—Pneumometer (cc. or liters).	Expiration—Spirometer (Cubic in.).	ARMS.	LEGS.	TRUNK.	CHEST.	ENTIRE BODY.	
1	68.5	175	112	110	25	25	60	55	72	65	60	50	60	55	60	58	90	90	95	90	80	82	300	300	88	80	145	140	168	165	170	168	120	115	111	105	115	490	140	135	28	65	65	65	165	220	6.05	5.60	255	1232	2337	1103	386	5058	1		
2.5	68.0	168	110	107	23	24	52	53	58	57	47	41	52	51	52	55	89	85	92	82	76	76	284	278	84	80	125	118	159	154	156	154	98	104	110	99	110	446	132	127	26	63	53	60	152	193	5.35	3.97	237	1130	2155	1017	346	4648	2.5		
5	67.1	159	102	92	22	21	48	49	51	61	40	38	48	49	46	49	82	79	77	74	70	71	263	256	78	79	108	104	131	127	136	134	88	95	106	90	103	386	121	122	25	60	48	49	129	158	4.95	1.51	224	1018	1936	914	288	4156	5		
10	66.0	148	88	79	19	18	42	43	48	46	35	33	44	42	43	42	77	71	63	63	61	62	232	235	71	74	95	88	112	108	118	123	83	87	91	84	83	329	108	112	23	55	42	41	107	135	4.24	4.16	213	896	1724	803	243	3666	10		
15	65.4	141	81	74	18	16	39	39	45	42	33	32	42	38	41	40	73	67	58	58	58	57	219	225	68	70	88	83	108	100	109	114	79	81	80	76	81	304	104	105	22	50	89	37	97	121	3.88	1.43	205	836	1615	748	219	3418	15		
20	64.8	135	76	70	17	15	36	36	42	39	30	30	39	34	39	38	68	63	53	53	53	53	207	217	65	66	82	77	103	94	102	106	74	75	72	71	82	276	99	99	20	45	36	34	87	108	3.63	3.40	202	778	1518	691	197	3184	20		
25	64.4	131	72	66	16	14	34	34	40	36	29	28	36	32	37	36	64	59	50	49	51	201	205	63	63	76	72	100	89	95	101	71	71	68	68	77	359	95	95	19	43	34	32	81	102	3.33	3.18	198	732	1437	647	184	3910	25			
30	63.9	127	68	63	15	14	32	32	37	33	27	27	38	29	35	34	59	55	46	45	48	194	197	60	60	70	69	95	85	90	95	67	67	64	64	72	225	90	90	18	40	30	30	75	96	3.13	3.05	193	684	1372	591	172	2825	30			
35	63.7	125	65	61	14	13	30	31	35	31	25	25	31	28	33	32	56	53	44	42	45	189	189	58	57	67	66	85	82	85	90	63	64	61	62	69	205	86	85	17	35	29	29	72	90	2.93	2.84	188	649	1307	559	165	2678	35			
40	63.3	122	62	58	13	12	28	29	32	29	24	24	28	26	31	30	53	49	41	39	42	181	180	56	53	62	61	80	76	81	84	59	60	57	58	66	178	80	80	15	35	28	27	67	84	2.83	2.75	183	608	1230	508	152	2498	40			
45	63.1	120	61	56	12	11	27	27	31	28	22	22	26	24	30	29	50	47	38	36	39	174	172	51	50	58	58	76	74	77	81	56	57	54	55	61	172	76	76	14	33	27	26	64	79	2.63	2.50	179	575	1170	484	144	2373	45			
50	62.8	117	56	53	11	10	26	26	29	26	20	20	24	22	28	27	46	45	36	34	36	167	162	47	46	53	54	72	70	72	75	52	52	51	51	54	149	71	71	13	31	24	23	59	74	2.43	2.08	173	539	1099	436	134	2208	50			
45	62.6	114	53	50	9	8	24	26	24	19	19	22	20	27	25	25	43	42	34	31	33	157	153	43	42	48	50	65	65	67	70	48	48	47	47	52	128	66	66	12	30	22	21	55	69	2.32	2.82	168	600	1015	397	125	2037	45			
40	62.1	112	51	48	8	7	23	23	25	23	17	16	20	19	25	24	41	39	32	29	31	129	149	39	39	45	46	62	62	64	65	44	45	44	43	48	16	62	61	11	27	20	20	52	64	2.22	2.74	164	471	953	365	117	1906	40			
35	62.1	109	47	44	7	7	21	21	23	22	16	15	16	16	24	22	38	37	30	26	26	140	136	35	33	41	41	57	56	59	60	40	41	40	39	44	103	56	55	10	25	19	18	43	60	2.02	5.22	159	435	875	330	108	1748	35			
30	62.0	107	45	43	7	6	21	20	22	20	14	13	16	15	23	21	35	35	28	25	26	130	129	30	29	37	37	52	52	55	55	36	37	37	36	41	95	52	51	9	23	17	17	44	55	1.92	4.20	154	408	800	305	99	1612	30			
25	61.7	104	41	38	6	5	20	18	21	18	12	11	14	13	22	19	32	32	26	23	22	118	116	26	24	32	32	47	46	50	49	32	32	32	32	36	85	48	46	8	22	15	15	39	50	1.72	2.17	148	371	714	275	89	1449	25			
20	61.4	103	38	34	5	5	19	17	19	17	11	10	12	12	20	18	30	29	24	22	20	108	106	22	22	30	29	42	42	45	45	24	29	31	28	32	70	44	41	7	20	13	13	35	45	1.62	1.16	143	342	647	247	81	1317	20			
15	61.3	100	33	30	5	5	18	16	15	9	9	11	10	10	18	15	24	25	21	20	15	93	89	18	18	26	26	36	35	39	35	24	26	27	24	29	69	39	35	5	19	11	11	30	39	1.41	1.91	135	304	542	218	69	1133	15			
10	60.7	98	29	27	4	4	16	15	16	14	8	8	10	10	15	14	22	21	19	18	12	79	70	14	14	22	17	33	32	33	34	21	24	22	22	26	61	33	30	5	17	10	9	25	33	1.31	1.81	127	270	459	191	58	978	10			
5	59.7	96	25	23	3	3	14	12	15	10	5	5	6	7	9	9	18	17	13	14	9	7	58	51	10	9	14	10	25	26	26	26	19	19	17	18	21	47	26	24	5	12	7	7	18	26	1.01	5.8	114	208	344	149	44	745	5		
2.5	58.6	89	23	20	2	2	10	10	12	9	5	5	5	5	5	5	12	12	10	9	5	5	37	34	7	5	6	6	17	17	18	18	12	12	11	13	20	32	22	20	4	10	5	5	12	24	.91	5.5	78	161	223	118	36	538	2.5		
1	58.0	79	20	20	2	2	10	10	8	5	5	5	5	5	5	5	10	10	8	5	5	5	20	15	5	5	5	5	5	5	10	10	10	10	10	10	10	10	20	80	20	20	2	10	5	5	10	20	.81	5.5	60	139	145	112	30	426	1

Nov. 17.

July 14.

Strength Measurements of *Miss H. P.* Taken *July 14, 1891* *Nov. 17, 1891* 189 189 by *C. M. D. C. M. S.*

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CHART III.

TABLE OF STRENGTH MEASUREMENTS.

Arranged from the Measurements of 100 Adult WOMEN, taken and compiled under the direction of J. H. KELLOGG, M. D., Battle Creek, Mich.

EXCEPT WHEN OTHERWISE INDICATED, QUANTITIES ARE EXPRESSED IN POUNDS AVOIRDUPOIS.

PER CENT	HEIGHT (Inches).	WEIGHT.	ARMS.										LEGS.										TRUNK.				RESPIRATION.						TOTAL STRENGTH.				PER CENT.																			
			R. Hand Flexors.	L. Hand Flexors.	R. Hand Extensors.	L. Hand Extensors.	R. Forearm Pronators.	L. Forearm Pronators.	R. Forearm Supinators.	L. Forearm Supinators.	R. Arm Flexors.	L. Arm Flexors.	R. Arm Extensors.	L. Arm Extensors.	R. Deltoid.	L. Deltoid.	R. Pectorals.	L. Pectorals.	R. Shoulder Retractors.	L. Shoulder Retractors.	R. Foot Flexors.	L. Foot Flexors.	R. Foot Extensors.	L. Foot Extensors.	R. Leg Flexors.	L. Leg Flexors.	R. Leg Extensors.	L. Leg Extensors.	R. Thigh Flexors.	L. Thigh Flexors.	R. Thigh Extensors.	L. Thigh Extensors.	R. Thigh Abductors.	L. Thigh Abductors.	R. Thigh Adductors.	L. Thigh Adductors.		Trunk Anterior.	Trunk Posterior.	Trunk R. Lateral.	Trunk L. Lateral.	Neck Anterior.	Neck Posterior.	Neck R. Lateral.	Neck L. Lateral.	Inspiration—Waist.	Inspiration—Chest.	Inspiration—Waist Expans'n (in.).	Inspiration—Chest Expans'n (in.).	Expiration—Pneumometer (C.C. of Mercury).	Expiration—Spirometer (Cubic in.).	ARMS.	LEGS.	TRUNK.	CHEST.	ENTIRE BODY.
1	68.5	175	112	110	25	25	60	55	72	65	60	50	60	55	60	58	90	90	95	90	80	82	300	300	88	80	145	140	168	165	170	168	120	115	111	105	115	490	140	135	28	65	65	65	165	220	6.0	5.5	60	255	1232	2337	1103	386	5058	1
2.5	68.0	168	110	107	23	24	52	53	58	57	47	41	52	51	52	55	89	85	92	82	76	76	284	278	84	80	125	118	159	154	156	154	98	104	110	99	110	446	132	127	26	63	53	60	152	193	5.3	5.5	57	237	1130	2155	1017	346	4648	2.5
5	67.1	159	102	92	22	21	48	49	51	51	40	38	48	49	46	49	82	79	77	74	70	71	263	256	78	79	108	104	131	127	136	134	88	95	106	90	103	386	121	122	25	60	48	49	129	158	4.9	5.1	51	224	1018	1936	914	288	4156	5
10	66.0	148	88	79	19	18	42	43	48	46	35	33	44	42	43	42	77	71	63	63	61	62	232	235	71	74	95	88	112	108	118	123	83	87	91	84	93	329	108	112	23	55	42	41	107	135	4.2	4.4	46	213	896	1724	803	243	3666	10
15	65.4	141	81	74	18	16	39	39	45	42	33	32	42	38	41	40	73	67	58	58	58	57	219	225	68	70	88	83	108	100	109	114	79	81	80	76	87	304	104	105	22	50	39	37	97	121	3.8	4.1	43	207	836	1615	748	219	3418	15
20	64.8	135	76	70	17	15	36	36	42	39	30	30	39	34	39	38	68	63	53	53	54	53	207	217	65	66	82	77	103	94	102	106	74	75	72	71	82	276	99	99	20	45	36	34	87	109	3.5	3.9	40	203	778	1518	691	197	3184	20
25	64.4	131	72	66	16	14	34	34	40	36	29	28	36	32	37	36	64	59	50	49	51	50	201	208	63	63	76	72	100	89	95	101	71	71	68	68	77	252	95	95	19	43	34	32	81	102	3.3	3.8	38	198	732	1447	647	184	3010	25
30	63.9	127	68	63	15	14	32	32	37	33	27	27	33	29	35	34	59	55	46	45	48	47	194	197	60	60	70	69	95	85	90	95	67	67	64	64	72	225	90	90	18	40	32	30	75	96	3.1	3.6	35	193	684	1372	597	172	2825	30
35	63.7	125	65	64	14	13	30	31	35	31	25	25	31	28	33	32	56	53	44	42	45	44	189	189	58	57	67	66	85	82	85	90	63	64	61	62	69	205	86	85	17	38	30	29	72	90	2.9	3.4	34	188	649	1307	559	163	2678	35
40	63.3	122	62	58	13	12	28	29	32	29	24	24	28	26	31	30	53	49	41	39	42	40	181	180	56	53	62	61	80	76	81	84	59	60	57	58	65	178	80	80	15	35	28	27	67	84	2.8	3.3	32	183	608	1230	508	152	2498	40
45	63.1	120	59	56	12	11	27	27	31	28	22	22	26	24	30	29	50	47	38	36	39	38	174	172	51	50	58	58	76	74	77	81	56	57	54	55	61	172	76	76	14	33	27	25	64	79	2.6	3.1	30	179	575	1170	484	144	2377	45
50	62.8	117	56	53	11	10	26	26	29	26	20	20	24	22	28	27	46	45	36	34	36	35	167	162	47	46	53	54	72	70	72	75	52	52	51	51	54	149	71	71	13	31	24	23	69	74	2.4	3.0	28	173	549	1099	436	134	2208	50
55	62.6	114	53	50	9	8	24	24	26	24	19	19	22	20	27	25	43	42	34	31	33	32	157	153	43	42	48	48	65	65	67	70	48	48	47	47	52	128	66	66	12	30	22	21	65	69	2.2	2.8	25	168	509	1015	397	125	2037	55
60	62.4	112	51	48	8	7	23	23	25	23	17	16	20	19	26	24	41	39	32	29	31	29	149	146	39	38	45	46	62	62	64	65	44	45	44	43	48	116	62	61	11	27	20	20	53	64	2.2	2.7	24	164	471	953	365	117	1906	60
65	62.1	109	47	44	7	7	22	21	23	22	16	15	18	16	24	22	38	37	30	26	29	26	140	136	35	33	43	44	57	56	59	60	40	41	40	39	44	103	56	55	10	25	19	18	48	60	2.0	2.6	22	159	435	875	339	108	1744	65
70	62.0	107	45	42	7	6	21	20	22	20	14	13	16	15	23	21	35	35	28	25	26	23	130	129	30	29	37	37	52	52	55	55	36	37	37	35	41	95	52	51	9	23	17	17	44	55	1.9	2.4	20	154	408	800	305	99	1612	70
75	61.7	104	41	38	6	5	20	18	21	18	12	11	14	13	22	19	32	32	26	23	23	21	118	116	26	24	32	32	47	46	50	49	32	32	34	32	36	85	48	46	8	22	15	15	30	50	1.7	2.3	17	148	371	714	275	89	1449	75
80	61.4	102	38	34	5	5	19	17	19	17	11	10	12	12	20	18	30	29	24	22	20	19	108	106	22	22	30	29	42	42	45	45	29	29	31	28	32	77	44	41	7	20	13	13	35	46	1.6	2.1	16	143	342	647	247	81	1317	80
85	61.2	100	33	30	5	5	18	16	15	15	9	9	11	10	18	15	26	25	21	20	15	12	93	89	18	18	26	26	36	35	39	38	24	26	27	24	29	69	39	35	5	19	11	11	30	31	1.4	1.9	13	135	304	542	218	69	1133	85
90	60.7	98	29	27	4	4	16	15	16	14	8	8	10	10	15	14	22	21	19	18	12	10	79	70	14	14	22	17	33	32	33	34	21	24	22	22	26	61	33	30	5	17	10	9	25	33	1.3	1.8	11	127	270	459	191	58	978	90
95	59.7	94	25	23	3	3	14	12	15	10	5	5	6	6	9	9	18	17	13	13	9	7	58	51	10	9	14	10	25	26	26	28	19	19	17	18	21	47	26	24	5	12	7	7	18	26	1.0	1.5	8	114	208	344	149	44	745	95
2.5	58.5	89	23	20	2	2	10	10	12	9	5	5	5	5	5	5	12	12	10	9	5	5	37	34	7	5	6	6	17	17	18	18	12	12	11	13	20	32	22	20	4	10	5	5	12	24	.9	1.5	5	78	161	233	118	36	538	2.5
1	58.0	79	20	20	2	2	10	10	8	5	5	4	5	5	5	5	10	10	8	5	5	5	20	15	5	5	5	5	10	10	10	10	10	10	10	10	20	80	20	20	2	10	5	5	10	20	.8	1.5	5	60	139	145	118	30	426	1

Strength Measurements of *Miss C. L.* Taken *189* *189* *20* *15* *189* by *80*

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CHART IV.

peculiar feature of the machine is the character of the weight, which, as stated, consists of a cylinder partially (about two thirds) filled with water. As the handles are raised, the water flows toward the upper end of the cylinder, thus adjusting the weight to the lifting ability of the muscles, which decreases in proportion as the muscles shorten in contraction. By this means, the muscular equilibrium is maintained to the fullest degree possible, and better results are obtained than can be reached when the weight is not made to vary automatically in adjustment to the varying lifting capacity of the muscles. The work required of the muscles of the trunk in steadying the body during the use of this apparatus rapidly increases their strength and tone.

Chart III shows the improvement in muscular strength and symmetry made by a patient under treatment and training during four months. In this case no displacement of the pelvic viscera existed, only general debility and weakness.

Chart IV shows the gain made in two and one half months by a young woman who had suffered a number of years from chronic retroversion and prolapse. The most marked improvement was in the strength of the anterior muscles of the trunk, which increased more than 250 per cent.

In conjunction with carefully adjusted and graduated exercises, I find electricity to be an invaluable aid in treatment, and have, since 1883, employed a current supplied by an alternating magneto-electric machine, which possesses the peculiar property of being able to excite vigorous muscular contractions without sensory effects. My usual method of applying this current is by means of a divided pole electrode placed in the vagina, and a sponge electrode applied to the abdomen. When used in this way, it produces vigorous action of all the muscles of the lower abdomen, the perineum, and in several groups of muscles of the thighs. Contractions so vigorous as to produce violent shaking of the patient's body, and even the table as well, can be easily produced in most patients without other sensation than that of motion. The special properties of this current are due, I think, to the peculiar construction of the machine producing it, by means of which currents of great uniformity are produced.

I have shown, at Fig. 7, the curve produced by this machine, which is in strong contrast to that produced by an ordinary faradic machine, shown at Fig. 8.

I do not wish to be understood as indicating that all or any considerable proportion of cases of chronic displacement of the pelvic viscera can be cured even by the removal of proximal causes and a faithful application of all hygienic means. Even a combination of hygienic and medical therapeutic measures will fail in the great majority of cases of long standing. Such surgical measures as may be appropriate in each individual case must be resorted to in the great majority of chronic

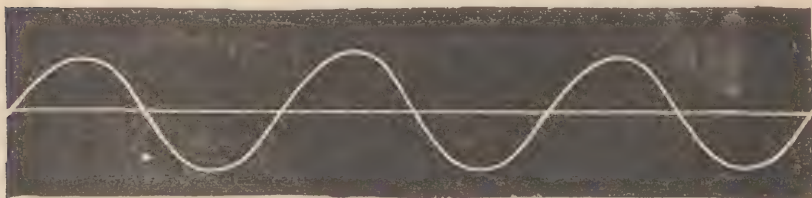


FIG. 7.

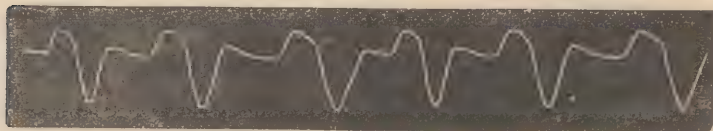


FIG. 8.

cases. This fact, however, does not detract from the importance of the considerations presented.

In the writer's opinion, neglect of these principles has often led physicians to subject patients to long-continued, and not infrequently mischief-producing, treatment for pelvic ailments of a trifling character which were wholly secondary factors in the case, the main features of which were the outgrowth of static disturbances of the abdominal viscera which required treatment by the application of suitable therapeutic means. A considerable number of cases have come under my observation which have been subjected to surgical procedures for the relief of retro-displacements of the uterus, and even extirpation of the ovaries for prolapse of those viscera, in which the patients were in nowise better for the operations which had

been performed upon them, simply because of the neglect of the operator to recognize the displaced condition of the abdominal viscera, and the irritability of the abdominal sympathetic, and the perverse reflex activity arising therefrom.

The facts and conclusions presented in this paper may be summarized as follows:—

1. Women suffering from visceral displacement of the abdomen or pelvis present a peculiar muscular type, characterized by weakness of the trunk muscles.

2. Cases of this sort also present peculiar deviations from the normal type of the human female figure, the most characteristic of which are a depressed or narrowed waist, flat or hollowed chest, round shoulders, prominent abdomen, forward carriage of the hips, and depressed position of the umbilicus.

3. A very large proportion of cases of displacement of the pelvic viscera present also displacements of the abdominal viscera of various forms and degrees.

4. The chief causes of visceral displacement in civilized women are an unhealthful mode of dress, and a lack of vigorous and symmetrical muscular development.

5. The so-called feminine type of respiration, or what is sometimes called costal breathing, is not a natural characteristic of the human female, but is the result of a mode of dress which restricts the normal respiratory movements of the lower chest.

